

**Study Guide**

For use with pages 247–252

**GOAL** Use multiplicative inverses to solve equations.**VOCABULARY**The **multiplicative inverse** of a nonzero number is the number's reciprocal.**EXAMPLE 1** Solving a One-Step Equation

$$-\frac{4}{15}x = -\frac{10}{33}$$

Original equation

$$-\frac{15}{4}\left(-\frac{4}{15}\right)x = -\frac{15}{4}\left(-\frac{10}{33}\right)$$

Multiply each side by multiplicative inverse of  $-\frac{4}{15}$ .

$$1x = -\frac{15}{4}\left(-\frac{10}{33}\right)$$

Multiplicative inverse property

$$x = \frac{\cancel{15}^{-5} \cdot \cancel{10}^{-5}}{\cancel{4}^2 \cdot \cancel{33}^{11}}$$

Use rule for multiplying fractions.  
Divide out common factors.

$$= \frac{25}{22}$$

Multiply.

$$= 1\frac{3}{22}$$

Write fraction as a mixed number.

**Answer:** The solution is  $1\frac{3}{22}$ .**EXAMPLE 2** Solving a Two-Step Equation

$$\frac{8}{15}x + \frac{7}{20} = \frac{13}{20}$$

Original equation

$$\frac{8}{15}x + \frac{7}{20} - \frac{7}{20} = \frac{13}{20} - \frac{7}{20}$$

Subtract  $\frac{7}{20}$  from each side.

$$\frac{8}{15}x = \frac{13}{20} - \frac{7}{20}$$

Simplify.

$$\frac{8}{15}x = \frac{6}{20}$$

Subtract.

$$\frac{15}{8}\left(\frac{8}{15}x\right) = \frac{\cancel{15}^3}{8}\left(\frac{\cancel{6}^3}{\cancel{20}_4}\right)$$

Multiply each side by multiplicative inverse of  $\frac{8}{15}$ .  
Divide out common factors.

$$x = \frac{9}{16}$$

Simplify.

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**Exercises for Examples 1 and 2**

Solve the equation. Check your solution.

1.  $-\frac{7}{12}x = \frac{14}{15}$

2.  $\frac{13}{18}x = \frac{39}{40}$

3.  $\frac{96}{121}x = -\frac{3}{11}$

4.  $-\frac{12}{19}x = -\frac{48}{95}$

5.  $\frac{12}{25}x - \frac{1}{9} = -\frac{11}{45}$

6.  $\frac{7}{24}x + \frac{1}{12} = \frac{23}{24}$

7.  $-\frac{3}{4}x + \frac{9}{16} = -\frac{1}{16}$

**EXAMPLE 3 Writing and Solving a Two-Step Equation**

You are training for a marathon. Currently, you can run 12 miles. You increase the distance you run on your long-run day by  $\frac{7}{10}$  mile each week. In how many more weeks will you be able to run 26 miles?

**Solution**

Write a verbal model. Let  $w$  represent the number of weeks you need to reach your goal.

Current distance you can run	+	Weekly increase	•	Number of weeks	=	Distance goal
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$$12 + \frac{7}{10}w = 26 \quad \text{Substitute values.}$$

$$12 + \frac{7}{10}w - 12 = 26 - 12 \quad \text{Subtract 12 from each side.}$$

$$\frac{7}{10}w = 14 \quad \text{Simplify.}$$

$$\frac{10}{7} \left( \frac{7}{10}w \right) = \frac{10}{7}(14) \quad \text{Multiply each side by multiplicative inverse of } \frac{7}{10}.$$

$$w = 20 \quad \text{Multiply.}$$

**Answer:** You will be able to run 26 miles in 20 weeks.

**Exercise for Example 3**

8. A baby with a length of 21 inches at birth grows at a rate of  $\frac{5}{6}$  inch per month. How many months old will the baby be when his length is 26 inches?